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PERSISTENT DUCTUS ARTERIOSUS.

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PERSISTENT DUCTUS ARTERIOSUS.*

AN interesting chapter might be written upon the difficulty often expressed in obtaining a hearing for new facts. It is, indeed, a curious circumstance that obstinate preconceptions frequently prevent the reception of obvious truths. Common rumour tells us that no one above the age of forty accepted the teaching of Harvey; we may well believe it. Perhaps the reluctance exhibited by the learned men of the 17th century to adopt his views should reconcile us to the difficulty we have in securing the reception even of facts which can be stated as definitely, and proved as certainly, as a mathematical problem. These remarks naturally arise as the result of considering the very interesting case now before us. As the various clinical features unfold themselves, you will find that the patient furnishes an excellent illustration of a cardiac affection to which much attention has been given by myself, but of which the diagnosis is not yet generally recognised. On two occasions the subject has been fully explained by me, yet my position is still like that of "the pelican in the wilderness," "the owl in the desert," or "the sparrow alone upon the housetop," to which the Hebrew singer pathetically likened himself. Before

* A Clinical Lecture delivered in the Royal Infirmary, Edinburgh.

dwelling at greater length upon this somewhat depressing aspect of the subject, let me state the facts of the case.

The patient is a strong and muscular man, aged twenty-four, who has been trained as a mason. He has always lived in the country, and enjoyed, as far as he knows, perfect health. As a trooper in the Yeomanry he was always in the van when it came to skirmishing on foot, or any other part of military duty demanding strenuous physical exertion. The patient, if indeed, he may be called so, was sent to me by Dr. Harvey Littlejohn. The reason for his appearing in the Infirmary is that he applied for admission to the Edinburgh Police Force, and on routine examination he was discovered to have some cardiac lesion.

His father died recently of influenza followed by chest complications. His mother and his brothers and sisters are perfectly healthy. He himself cannot remember ever being ill, except when he passed through an attack of measles in youth. He has never suffered from breathlessness or palpitation. There has never been a trace of cyanosis or of chilliness. In short, there have been no symptoms connected with the circulation. On inspection there is no trace of any abnormality either in form or colour ; there is no preternatural pulsation in the vessels of the neck ; but on producing redness of the forehead there is a slight capillary pulsation. The apex beat is seen in the fifth intercostal space just inside the mammary line ; the arteries are perfectly healthy ; the pulse is of moderate pressure, and the rate varies from 70 to 80. The character of the pulsation shows a slight increase in celerity, but it can scarcely be called a good example of Corrigan's pulse. On applying the hand over the præcordia the apex beat is

found to have its maximum intensity in the fifth intercostal space half-an-inch inside of the mammilla, and shows no departure from normal strength and rhythm. Palpation, however, reveals one interesting abnormality. In the third left intercostal space, close to the sternum, there is a beautiful thrill, and the rhythm of this thrill is most characteristic. It begins distinctly after the apex beat, as is appreciated on placing a finger over it for comparison, while another finger rests over the third left intercostal space, and it continues for a considerable time after the cessation of the apex beat. On closer analysis it is found that the thrill is continued almost until the following apex beat, and there can be felt most distinctly the recoil of blood upon the semilunar cusps producing the second sound just about the middle of the thrill. This thrill in itself is, as we shall see, absolutely diagnostic. The upper border of cardiac dulness is at the middle of the third left costal cartilage, and transversely it extends $1\frac{1}{4}$ inches to the right, and $4\frac{1}{4}$ inches to the left of midsternum. From the examination, therefore, so far, we may conclude that there is little, if any, hypertrophy. The phenomena observed on auscultation are, at the first blush, slightly confusing, as there is apparently one long continuous murmur occupying both systole and diastole, with a reinforcement of intensity during each of these phases. On more careful analysis, however, the rhythm and distribution of three distinct murmurs become quite clear. At the inner end of the first right intercostal space there is a short, systolic murmur, which is conducted upwards into the vessels of the neck. In the midsternum, opposite the attachment of the fourth costal cartilages, there is a soft, short diastolic murmur which is propagated for a

short distance towards the ensiform cartilage. Taken in connection with the other phenomena, which have been described, there can be no doubt that these two murmurs are produced by aortic obstruction and regurgitation. In the third left intercostal space, an inch and a half from the edge of the sternum, there is another murmur perfectly distinct in character from the two just mentioned. It begins quite obviously after the commencement of the first sound. It is continued during the latter part of that sound and the whole of the short pause. It persists throughout the second sound, and dies away gradually during the long pause. The murmur is distinctly rough and thrilling in its character. It begins, however, somewhat softly, and increases in intensity so as to reach its acme just about, or immediately after, the incidence of the second sound, and from that point gradually wanes till its termination. The second sound can be heard to be loud and clanging, and when carefully analysed it is the pulmonary part of that sound which is accentuated. The blood shows a slight increase in its normal constituents. The erythrocytes reach 5,300,000, and the leucocytes 10,000 per c.mm. ; the hæmoglobin amount to 90 per cent. There is, therefore, a slight tendency towards the condition of blood found in cyanosis. There is no trace of any departure from normal conditions in any other system of the body.

In this case we have phenomena which are not merely characteristic, but are absolutely pathognomonic. Although the arterial pulse is not a very good example of that which is so often found in aortic incompetence, yet it has a certain amount of resemblance to the features described by Corrigan and in association with the capillary pulse it is

suggestive, the position and conduction of the systolic and diastolic murmurs are characteristic, and there can be no room for doubt as to the existence of a moderate degree of aortic obstruction and incompetence. We may dismiss this part of the case without further comment except to remark that the aortic lesions have produced but little interference with the circulation, seeing that there is practically no alteration in the size of the heart.

The most interesting features of the case, and those which have led me to bring the patient before you to-day, centre in the thrill which is felt in the second intercostal space, and also in the murmur which accompanies it, the maximum intensity of which you will remember is in the third left intercostal space. It is unnecessary to tell you that the rhythm of the thrill and murmur at once negative the possibility of their being produced in the heart itself. There is absolutely no possibility of the production of a murmur in the heart surviving two phases of cardiac activity. In this case the thrill and murmur begin about the middle of the first sound, when the great venous valves are closed and the arterial valves are open. They continue during the short pause, and accompany the second sound, when the auriculo-ventricular valves are opening and the arterial valves are closing, and they die away about the middle of the long pause. No cardiac valvular lesion could produce such phenomena. No lesion of the inter-auricular or inter-ventricular septa could produce such effects. The only possible cause for it must be a lesion connected with one of the great arteries in which there is high pressure existing from shortly after the ventricular contraction until shortly before the next ventricular systole. With the situation

of the thrill and murmur as they are in this case, it must be obvious that the aorta or the pulmonary artery must be the origin of the appearances. As there is no indication of any disturbance connected with the chest, apart from the facts which have been brought before you, it is perfectly obvious from the anatomical position of the thrill and murmur that they must be caused by a stream passing from the aorta to the pulmonary artery. It is possible to conceive of a communication between the two vessels produced by a small aortic aneurysm opening into the pulmonary artery and producing physical signs somewhat resembling those which have been placed before you. Roberts, (1) Wade, (2) and Walsh (3) have described such cases, and several similar instances have recently been described by Gairdner (4), who has summarised the observations of the authors just mentioned. Two points negative an explanation of this kind: Firstly, there is very little alteration in the condition of the arterial walls; secondly, the thrill and murmur do not begin at the commencement of the first sound, as does an ordinary systolic murmur in aneurysm of the first part of the aorta, but they follow the commencement of the first sound by an appreciable interval. It is, therefore, absolutely beyond the possibility of doubt that we have in this case a persistent ductus arteriosus. Several cases presenting perfectly identical symptoms and signs have been under my care during the last few years. In describing systematically the pathological features and clinical results of persistent patency of the arterial duct, two of these cases were detailed by me, and the rhythm of the thrill and murmur was diagrammatically figured in order to illustrate the semblance of rational symptoms and

physical signs produced by the affection.(5) Two years afterwards a most beautiful example of the affection, absolutely free from all complication by the presence of any other lesion, was under my care in the Royal Infirmary. The features of the case were demonstrated in the wards and in the theatre, and the diagnosis of a perfectly uncomplicated ductus arteriosus was made. The patient was in my ward on account of anæmia, and, after making an excellent recovery, she went out. A few weeks later she was readmitted on account of lobar pneumonia, of which she died, and at the *post mortem* examination we found that there was absolutely no trace of any cardiac lesion, but that the ductus arteriosus was patent. These facts formed the subject of a Clinical Lecture, afterwards published, (6) and furnished an absolute proof of the possibility of diagnosing the lesion under consideration. And yet, in spite of this absolute demonstration of the correctness of my contention as proved by the pathological results, the diagnosis of this lesion appears to be still a subject of scepticism. In the latest edition of one of the best works on "Physical Diagnosis," that of my friend Dr. R. C. Cabot, the following sentence occurs :— "It has been claimed that a murmur persisting through systole and into diastole is diagnostic of an open arterial duct, but this supposition is not borne out by *post-mortem* evidence."(7) The clinical lecture to which reference has been made must have escaped his observation.

To sum up the essential facts upon which the diagnosis of persistent arterial duct may be confidently founded, let me mention that there may be no dyspnœa, cyanosis, œdema, or other evidence of disturbance of the general circulation, the recognition of the lesion depending entirely on

the presence of two physical signs. Inspection may fail to reveal any facts of importance ; palpation yields the valuable sign of a long thrill following the apical impulse, and continuing beyond the recoil of the blood on the semi-lunar cusps, the shock of which may be felt during the thrill ; percussion may negative the suspicion of any increase of cardiac dulness—in fact, it usually does so in uncomplicated cases ; auscultation gives the second and the most invariable evidence of the lesion in the presence of a murmur which is pathognomonic. Beginning distinctly after the first sound, it accompanies the latter part of that sound, occupies the first pause, accompanies the second sound, which may be accentuated in the pulmonary area or may be doubled, and finally dies away during the long pause.

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